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Sand dunes at China Cove, San Clemente Island, showing the manner in which the great spreading plants of abronia knit together the sand and act to hold the dunes in place.

Plant Hunting on an Island

By NELL MURBARGER

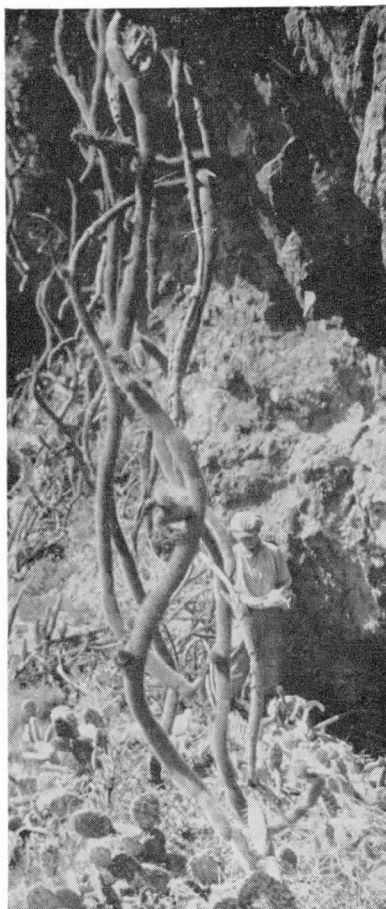
Photographs by the Author

SAN Clemente Island, lying seventy-five miles west of San Diego, California, is like several worlds within a world.

It is a world of jagged headlands, high, windswept mesas, shifting sand dunes, wooded valleys, lush green meadows, yawning volcanic caverns, precipitous canyons. Every part of the island has its individual climate. Nothing could differ more radically than the east and west sides—one a land of rich humus, violets, ferns and spring-watered green slopes; the other, a dry, hot, wasteland of cactus-infested lava breaks.

On the Island's northwest side there are acres upon acres of sand dunes, as restless as the waters that lave the shores; on the southeast side there are canyons so sheer of wall that one's eye may travel up their rocky sides for a thousand feet and at the top find the sky stretching away in a narrow river of indigo.

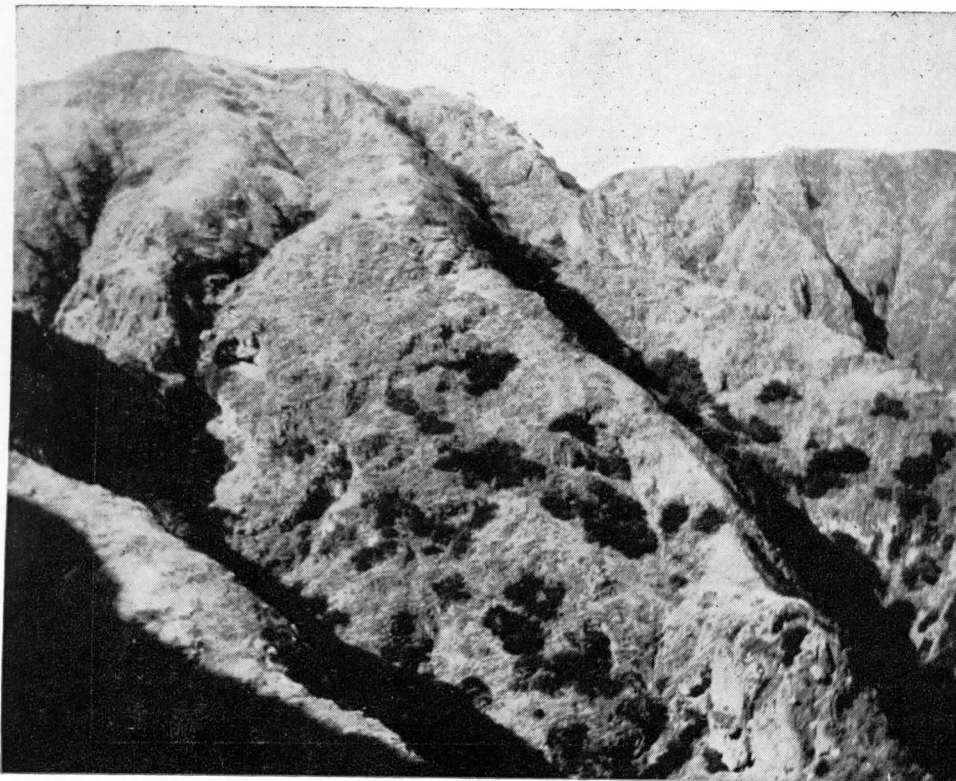
Before my first visit to the island, I



was informed, definitely and positively, that there was nothing of interest to a botanist; that there was neither shrub nor tree on the entire 31,500 acres. Still, I reasoned, there must be some sort of plant life. Besides, three other adventuresome souls wanted to inspect the heavily-guarded empire. So we wangled a ten-day visitor's permit from the lessee of the Island.

Practically the only thing our party acquired during that first trip was an insatiable determination to return. But ten years passed before that goal was realized. Meanwhile, San Clemente had been taken over by the U.S. Navy. When we again went back, it was for six months. Our party consisted of a zoologist, two archeologists,

Member of the author's party examining part of a skeleton found in cave at right. Snake cactus, like sinewy pythons, hangs pendant from the cliffside far above,



Near the summit of Mt. Cortez, east side of San Clemente Island, showing rough topography of canyons and ridges.

and myself—rather a Grade B botanist—who was commissioned to make a complete collection of the Island flora for the University of California at Berkeley.

During the six-months search, in which the zoologist and I pooled our efforts—to our mutual benefit—we collected 205 species of plant life, exclusive of lichens and fungi. This represented some 100 varieties more than had ever been credited to the Island by previous naturalists.

San Clemente proved to be a land of concentration and individuality. We found certain species of trees confined to a few specimens on a single ridge. Four or five plants of a species might be encountered in an area the size of a dinner table, and never another found elsewhere.

Many of the Island plants are extremely rare. In three canyons on the island's west side we found growing a total of eight beautiful shrubs, several of them as much as ten feet in height. This shrub is known as *Crossosoma californicum*, and is so rare it has never been accorded a common name. So far as is known, it is confined to the California Islands of Santa Catalina and San Clemente, and to Guadalupe Island, off the coast of Mexico.

On all of our exploration, we found only one specimen of *Baccharis pilularis consanguinea*, a densely foliated, sticky leafed shrub whose all but unpronounceable name is entirely out of proportion with the importance of the plant. Search also failed to reveal more than one specimen of a buckthorn sub-species that had been taken sparingly on Santa Barbara and Catalina Islands but was never before reported from Clemente. Although five species of the genus *Atriplex* (salt brush) were collected, the species *A. lentiformis*

breweri was represented by only eight bushes located in a single ravine. Greasewood, plentiful on Catalina, was represented on Clemente by not more than a dozen shrubs on a single ridge of the island's east side. And so it went.

One day, a month after our arrival, the archeologist came in with two acorns he had screened from an Indian mound. It seemed impossible that the husks could have remained intact through all the generations since the island had last been occupied by the aborigines. Still we had tramped over many miles of canyons and mesas and had

never once sighted an oak. It was several weeks later that we discovered the first oaks. There were about fifty trees in the group, the largest having a trunk measuring ten feet and six inches in circumference. We had been within a half-mile of them, dozens of times, proving how well secreted even large objects may be in a terrain as rough as that of San Clemente.

Later, we found oaks in many situations, the largest group being some thousand trees on the east side of Mount Cortez at about 1200 feet elevation. The trees were closely spaced and nearly straight of trunk. They were *Quercus tomentella*, a species confined exclusively to the Channel Islands and to Guadalupe Island. It is unknown on the mainland of either the United States or Mexico.

One of the loveliest trees on Clemente is the islay or Spanish cherry, *Prunus lyonii*. Round of head and almost perfect in form, it is densely clothed in glossy evergreen leaves, comparable in size and texture with those of the magnolia.

In May the trees were laden with long racemes of white flowers, the fragrance of which was carried for a considerable distance down wind. By autumn these flowers are matured into luscious purple cherries an inch in diameter and of a piquant flavor.

On the Island's highest, most exposed ridges, grew forests of ironwood. Oftimes these picturesque trees would seem to form in single file, and, like a legion of bent, avenging soldiers, would lead up and over the skyline in an endless march. The wood of this species is among the hardest known and it is said that, when properly seasoned, an arrow made from it may be shot through a pine door.

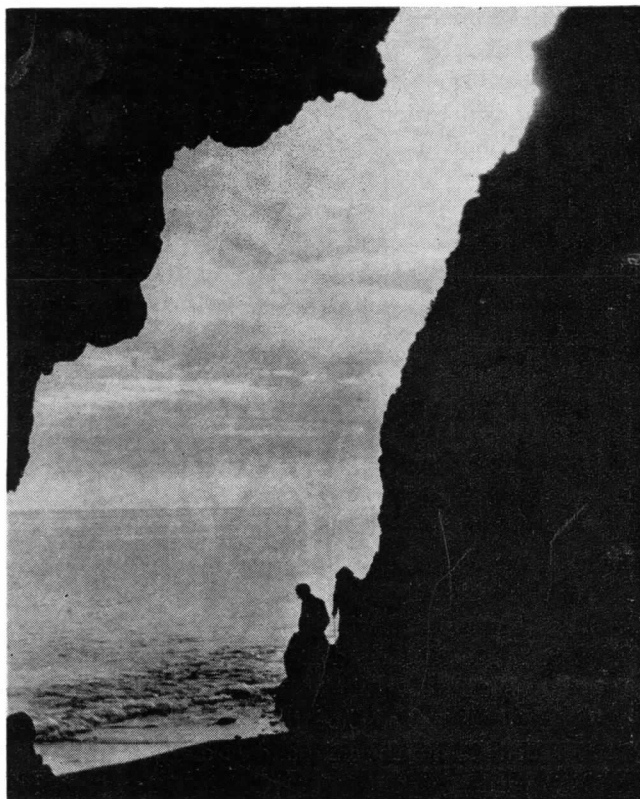
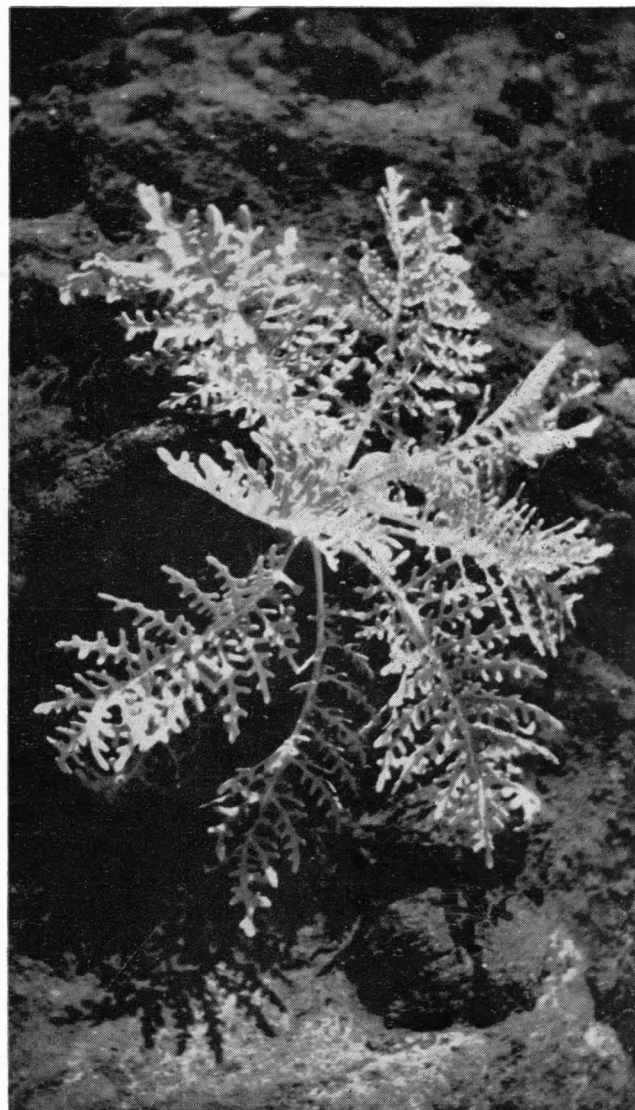
Other than the islay, ironwood and oaks, the island's

A variety of "Dusty Miller," *Erlophyllum nervinii* which is found on the Island in considerable quantity but is said to be indigenous to no other place in the world. These plants, which were as lacy as a fern and silvery white, grew in the driest and rockiest of locations where it did not seem there would be soil enough to support any type of growth.

only other large trees are the toyon, mahogany sumac and elderberry, all of which are well-known on the mainland. Except for the unusual size of the island representatives, they would be of no particular interest. Clemente's elderberry trees were the largest we had ever encountered, one near our camp being sixty feet in height. Incidentally, the elderberry is the only tree on Clemente that sheds its leaves in winter, just as the scarlet penstemon is the only shrub not ever-green.

During April and May, the broad, flat top of the Island is a golden carpet, visible several miles at sea. One of the two plants responsible for this unusual effect is *Lamarckia aura*, a golden-topped grass that covers hundreds of acres of the mesa. The other plant is the golden baeria, *Baeria chrysostoma gracilis*, which blankets the slopes so closely that the ground beneath can scarcely be seen.

It is typical of Clemente that these little daisy-like baerias, given good soil and sufficient moisture, would attain a height of twelve inches, with flowers the size of a fifty-cent piece. In dry, rocky situations, however, they would not exceed one or two inches in height, the tiny flowers measuring scarcely a quarter-inch across and limited, perhaps, to three petals. Whether a foot



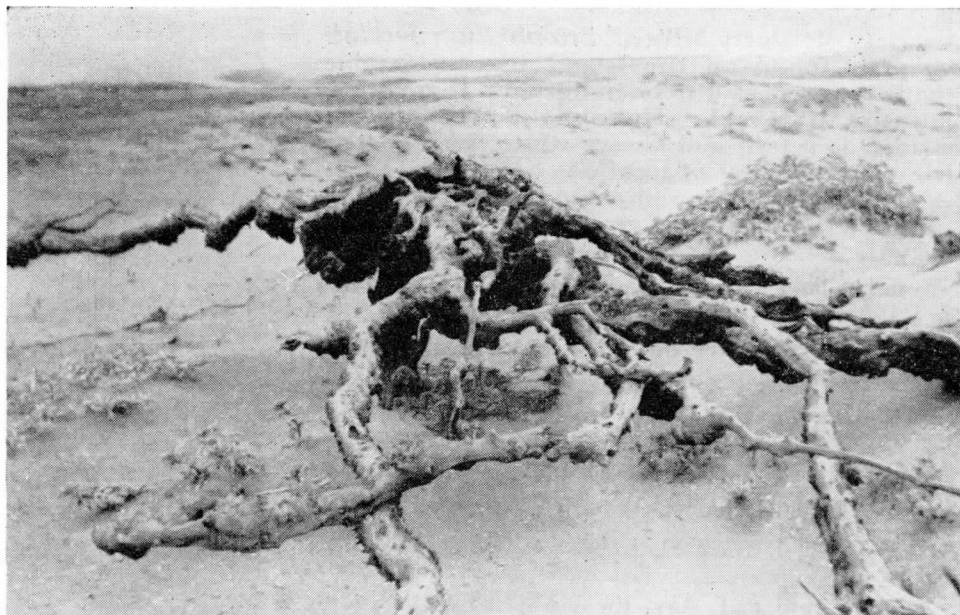
tall or an inch, the same golden carpet effect was achieved. The same condition prevailed in the alfileria, known to California children as "stork bill."

High on the north and west sides of Mount Cortez, where it is either very hot or very cold, and extremes of flood and drought follow one upon the heels of the other, the alfileria covered acres upon acres of land. In this unfavorable environment an entire plant would frequently consist of a single leaf, not fully an inch in length, and one seed pod, which seemed to spring directly from the crown without benefit of stem. Every plant, I believe without exception, had this little, saber-like pod thrust, point upward, like a brave guardian of the painful inch the species had struggled to achieve on that dry, sterile mesa.

Quite a different spectacle was presented in the lush, fertile meadows of the east side. There we found many instances where the same variety of alfileria

Honeycombing the eastern and southern exposures of San Clemente Island are hundreds of volcanic blowholes. Many of these have been eroded to form caves into which the surf pounds at high tide.

All that remains of San Clemente's last *Lycium richii*, reputedly the last of its species to have been alive in the continental United States. The tree was popularly known as "banyan," its limbs having the habit of spreading, dropping to the ground's surface and rerooting.



had grown too tall to stand erect, and was creeping over the ground. Many of these stems were as thick as a man's finger, and a single plant often spread over a radius of six feet.

Vast areas of the Island were densely thatched with cactuses; opuntia, cane cactus and the viciously barbed choya, predominating. All too often our trail would end in a *cul-de-sac* of impenetrable spines. Most picturesque of the Island cactuses is the snake cactus, which hangs pendant on the canyon walls and gracefully drapes itself over the entrances of countless volcanic caves. We found it not uncommon for this variety to have a stem forty or fifty feet in length and nowhere larger around than a man's wrist. Scattered growth was found even in the glaring sweep of the dunes, where there was no semblance of soil, only free-running white sand, ever shifting with the play of the winds.

Most plentiful dune inhabitant was the *Franseria*, or burr weed, which spread over the ground like a plaster, its long, tough roots effectually imprisoning the sand beneath it. Lilac and cerise sand verbenas were likewise both enlisted in the cause of dune preservation. Always these plants were found growing on hillocks of sand, maybe four feet across, perhaps forty feet. It was not chance that had placed them on these hillocks; their intricate root system had retained the sand beneath them, while the rest of the dune had gradually blown away. We traced abronia roots on the surface fifty feet from the plant's main stem.

Except for its rarity, the fraternity of sand retainers would also include *Lycium fremonti* a variety of box thorn. These dense, thorny shrubs had formed an impenetrable thicket over the space of an acre at Northwest Harbor, but nowhere else on the island were they noted.

Another species, which for decades fought a losing battle with the vagaries of the dune, was *Lycium richii*. One specimen of this tree once grew on Catalina Island,

but, due to its extreme rarity, souvenir hunters avidly hacked chips from it until it fell by the wayside. This left the specimen on San Clemente standing alone, reputedly the only one of its species known in the United States.

I knew of this tree's existence for nearly fifteen years before I ever saw it. Then, after making a sixteen-mile hike to Northwest Harbor for the express purpose of viewing it, found that it had succumbed either to the elements or to advanced age.

The wood of the skeleton that remained was knotted and extremely hard. The trunk was about four feet around, and the twisted, drooping limbs covered an area of a hundred square feet, often dipping to the surface of the ground and again rising. This characteristic is responsible for its common, although erroneous, name of banyan.

Further exploration revealed the stubs of many other "banyans," undoubtedly long dead but well preserved in the hot, dry climate. A considerable forest of them may have once clustered there.

On the northern boundary of the sand dune we came upon the starkly simple little hut of Russian John, a hermit fisherman. He was cordial and hospitable, pressing upon us bread, boiled lobsters and water.

The dune was slowly enveloping his little domain. It had stolen forward like a thief in the night, until it lay heaped against the rear of his cabin. With every vagrant breeze, little siftings of sand stole into what he proudly termed his "front yard."

Russian John's most cherished possession was a tree mallow, *Lavatera assurgentiflora*. The lovely tree stood nearly twice his height, with a clean straight trunk. It was densely covered with huge, hibiscus-like flowers, deep red in the center and shading to rose on the edges. He told us that several years before he had found it growing wild at the edge of the dune near Seal Harbor; had rescued it from the sand and carefully transplanted it to his yard.

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CAPE ROMAIN

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the turkey food, and that is a management problem, and then the wily raccoon inserts his black paws into the picture by eating the turkey eggs. When the refuge manager contemplates this depredation by warring on the raccoon the animal-lovers protest loudly that the raccoon is a gentle beast and would not harm a single egg. And that is another excellent example of the broad scope of the phrase "wildlife management."

Not content with turkey eggs, the raccoon preys upon another interesting refuge inhabitant, the loggerhead turtle, which comes ashore in droves during moonlit nights in May and June to lay its eggs on the beach. On a quarter-mile of beach last year 99 turtle nests were counted, with a guestimate of about 125 eggs to the nest. That should have produced quite a crop of young ones, but Mr. Raccoon thinks nothing of ganging up with his fellows to stand behind an egg-laying turtle and seize the eggs almost as she drops them.

To keep the human predator at bay the Fish and Wildlife Service has erected four tall, steel towers at strategic points in the refuge. Visitors think these have something to do with bird watching, but not so. From them refuge guardians can watch the human birds who tend to sneak into the refuge occasionally for a shot at a marsh hen, or a duck, or a snatch at a nest of turtle eggs. During the war these towers were manned by the Coast Guard in their watch for submarine activity, and it is the proud legend of the refuge that they proved useful in the pinpointing and subsequent destruction of some of these enemy weapons.

The island has one drawback for it is rich in wood ticks. During the cool weather the ticks remain in abeyance, but with the coming of spring they occur in such quantity that it is impossible to step off any pathway without picking up some of these burrowing pests. Some of them are even impervious to high-powered insecticides, and use of some of these poisons would so greatly endanger other insects upon which the birds must feed that no satisfactory fight can be made against the ticks.

For if the insects were destroyed Bull's Island might lose its painted buntings, which are so eagerly sought after by bird watchers and photographers. So this is another management problem with which the four men at Cape Romain must cope in their ceaseless battle to maintain this remarkable refuge.

Arrangements and reservations for transportation by government boat and accommodation at the Dominic House lodge may be made by mail through the Refuge Manager, Cape Romain National Wildlife Refuge, McClellansville, South Carolina. Boat departure times are governed by the tide and it may be necessary to wait over night in McClellansville. The refuge manager will arrange comfortable accommoda-

tions in town when necessary, if he is asked to do so. This reserving is entirely a courtesy on the part of a very busy public servant, a thought to keep in mind when writing.

Reservations for the twice-weekly Audubon Society's trips may be made through the society's national office, 1000 Fifth Avenue, New York City, 28. These group trips, under the guidance of the distinguished bird man, Alexander Sprunt Jr., leave from Charleston. The fee is \$15 per person plus charges for accommodation on Bull's Island.

Room and meals on the island are \$6 per day. Passage to the island by government boat is free. Boats may be chartered locally for off-schedule runs to and from the island. They are expensive.

PLANT HUNTING ON AN ISLAND

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"The dune was almost a mile from my cabin then," he said, "and I thought I could protect the flower if I brought it home, but now the dune is here, too." He patted the smooth trunk affectionately. "It is such a pretty flower!"

We saw his eyes drop to the ground, where already the sand was starting to encircle the base of the tree. We knew that he was seeing the dune creeping up, hour by hour and day by day, gradually smothering the leaves and the flowers until it would choke the last breath of life from the gallant plant.

Russian John did not know it, but his "pretty flower" was one of a race that has puzzled botanists for all of the many years since the Channel Islands were first searched over for plants. Eighteen species of *Lavatera* are found native to the Mediterranean, one in Australia, and, except for four varieties on the Channel Islands of California, not a single species is indigenous to the American continent.

Writing in the *Botanical Gazette* in 1886, William S. Lyon laid particular emphasis on the mystery of San Clemente's *lavateras*.

"It is commonly known," he wrote, "that very many plants with skillful manipulation improve under cultivation. . . This is anything but the case with *Lavatera assurgentiflora*, which I collected on San Clemente from larger plants, in finer foliage and greater size and brilliancy of flower than anything observed in gardens. Its introduction into cultivation must forever be a bar to its complete extirpation; yet the natural tendency of the species I think we can show to be on the decline or toward extinction. Sealers report that, once abundant on Anacapa and San Nicholas, it is now scarce; on Clemente it was only observed in two localities, and only one or two plants in each; yet, only a dozen years ago (1874) it constituted un-

broken forest, extending for miles upon the high plateaus."

After the scientists have had their say, and the learned minds of two hemispheres have accorded the matter their most searching study, the fact remains that Russian John's protegee was the last specimen of *Lavatera* left on San Clemente.

Recently I talked with a fisherman who knew San Clemente well. He said that the advancing dune had at last forced Russian John to abandon the simple little home he had loved so well.

"For the last year or so," said my fisherman friend, "John spent most of his time trying to keep the dune swept out of his yard. But you can't fight a sand dune. I don't see why he stayed as long as he did."

One reason he had stayed, I knew, was because of a "pretty flower" he had once rescued from that same advancing dune. His abandonment of the cabin could mean only one thing—San Clemente's *Lavatera* chapter was closed.

ALICE EASTWOOD

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1916, Miss Eastwood eagerly returned to her job. One of her first innovations was a living flower exhibit, a flower show that, still continued, is probably one of the oldest on record. And her fire-salvaged specimens formed an invaluable nucleus for future collecting.

To expressions of gratitude from Academy and city officials for her work in the fire, she replied simply: "It was a joy to me while I did it, and I can still have the same joy in starting it [the collection] again. . . The kindness of my friends has been great. I didn't know I had so many or that their affection for me was so warm and sincere. How fortunate I am!"

This from a woman who had lost all personal possessions in the fire—home, everything!

At their "Alice Eastwood Semi-Centennial," Academy officials printed this program tribute: "In this great and devastating holocaust [the fire of 1906], Alice Eastwood gave ample evidence of her spirit and courage. It was through her initiative and bravery that most of those Academy possessions. . . were saved. These included hundreds of botanical types, specimens that would be irreplaceable if destroyed. . ." The account went on to comment on Miss Eastwood's prudence in having had valuable specimens segregated from the main collection "so that they might be secured immediately in just such an emergency," a custom now thoroughly established in most herbariums throughout the country.

State agriculture officials have consulted Miss Eastwood on perplexing problems of Nature. Universities have asked her advice. Scientific societies throughout the world have sought her membership.